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Marine Cazenave and Davorka Radovčić

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1 The Neanderthal patellar morphology differs from that of recent humans by being anteroposteriorly thicker and by showing more symmetric articular facets and higher angles. However, it is still unclear to what extent these differences affect knee kinesiology. By using micro-focus X-ray tomography, we qualitatively and quantitatively characterized the inner conformation of six adult Neanderthal patellae from the OIS 5e site of Krapina, Croatia, and compared their pattern to the configuration displayed by a sample of 31 patellae from 22 recent adult humans of both sexes and various origin. The Neanderthal patellae show a rather coherent endostructural signal, with minor variation. The results support the previous morphologically-based suggestion that 215.1-Pa 1 (right) and 216.1-Pa 5 (left) might represent the same individual, but cast doubts about the possible individual association between 215.3-Pa 3 (right) and 216.9-Pa 14 (left). The cortico-trabecular complex, thicker anteriorly than posteriorly in both taxa, is, on average, slightly thicker in the Neanderthal assemblage. For the trabecular thickness, Krapina falls within the recent human variation. Conversely, cancellous bone density in the Neanderthal sample is higher medially, and degree of anisotropy at the inferior aspect is lower than measured in the comparative sample. While a bone reinforcement in the lateral and superior aspects is present in recent humans, in Krapina it is only found laterally. Our results suggest comparable mechanical loading conditions at the vastus lateralis insertion, but

also differences in size, insertion and/or function of the vastus medialis and vastus intermedius. The only other evidence available so far from an adult Neanderthal patella, Regourdou 1 (France, OIS 4), does not fully overlap the signal recorded in the assemblage from Krapina. The assessment of other Neanderthal kneecaps would help clarify the extent of variation within this taxon and identify possible evolutionary trends in the loading conditions at the knee joint.

AUTHORS

MARINE CAZENAVE

Skeletal Biology Research Centre, School of Anthropology and Conservation, University of Kent, Canterbury, UK
marine.cazenave4[at]gmail.com

DAVORKA RADOVČIĆ

Department of Geology and Paleontology, Croatian Natural History Museum, Zagreb, Croatia